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ABSTRACT

A clinical intervention based on behavioral items from the Brazelton Neonatal Behavioral Assessment Scale (BNBAS) was implemented at a hospital among 40 lower middle class Portuguese mothers between 18 and 35 years old 3 days after delivery. The intervention aimed to promote mother-infant attachment by increasing mothers' awareness of the individual social competencies of their newborn and mothers' proficiency in interacting with infants. Infants were observed for about 30 minutes and assessed with the BNBAS on the 3rd and 28th day of life. Mothers assigned to the experimental group were visited by a pediatrician who demonstrated BNBAS items of animated visual and auditory sensorial orientation, consolability, and cuddliness. On an individual basis, mothers were invited to elicit auditory performances of infants, and talk to, console, and hold them. Mother-pediatrician dialogue focused on infants' observed competencies and behaviors. A control group of 20 mothers received instruction on special pediatric care they should provide. Two instruments were used twice to measure changes in mothers' attitudes and expectations, and one was used to assess mothers' perceptions of their babies. Videotaped behavioral interactional sequences were analyzed with Lieberman's Observation Scale to determine to what extent dyads had achieved homeostasis and attachment. Findings suggested that the early intervention led to positive changes in maternal and infant behavior. (RH)

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EARLY INTERVENTION AND MOTHER-INFANT INTERACTION DURING THE FIRST THREE MONTHS OF LIFE

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INTRODUCTION

Contemporary literature has portrayed either the human infant, seen psychobiologically and socio-affectively, either his family, namely his mother, through a broad spectrum of studies which have tried to encompass the different and complex roots of interpersonal communication, which sustain specifically the fundaments of bonding and interaction in mother-infant dyad.

From an interactional point of view, the adaptative mother/infant relationship is a complex mutual process characterized by an appropriate "match" of mother and infant capacities as evidenced by synchronon behavioural cues (1).

The mother/infant dyad is, now more than ever, firmly recognized as a dynamic unit where both baby and caregiver are active participants in a double-way process which enables them to adapt to each other and, mutually, get the stimuli needed for further interactions (2,3). This feedback transactional model is recognized as a dominant theoretical framework of infant development approach, nowadays (4,5).

Early experiences, where affect plays a very important role, although not yet completely clarified, have been largely suggested as having an important and significant impact on the foundation of parent-infant communicative system and bonding, considered as a development phenomenon (6).

The concept of stimulation, supposed central to understand the dynamic effects of such early experience, has been retained by investigators' intents on charting the different modalities of mother/infant interaction.

Numerous investigations of maternal influence on infant functioning have revealed the positive role that attentive, warm, stimulating, responsive and nonrestrictive caregiving plays in promoting healthy early development (7,8,9,10).

Results of the mentioned studies provided the basic tools for the concept of intervention, which can be widely interpreted as involving any systematic attempt to alter the course of development or of relationships. In this context, human functioning is supposed to be flexible, which means that processes involved in human change are plastic and, so, opened to alteration.

Investigators have recently moved beyond the bonding model of newborn intervention, trying new attempts to facilitate the development of parent-infant relations (11,12).

Several factors have stressed the opportunity of these kinds of interventions, nowadays. The rapid growth of human population represents an increasing burden on social adaptation as well as inter-individual coexistence. Social adjustment to youth, sexual life, parenthood and child rearing have been shaken by crisis that may reflect the consequences of such burden.

On the other hand, parents, being both social and cultural realities, often respond to their infants' behaviours according to the context of the culture in which the family lives. Cultural changes are also inductor factors of risk of inadaptation. Many young parents no longer have their own parents or other relatives to help them and, in fact, learning to care of a child is no longer a natural part of growing-up.

It also must be emphasized that parental adjustments to the firstborn child are likely to be particularly stressfull. So, there are theoretical reasons for limiting a study on early intervention to firstborns in the expectation of maximizing potential efects.

Some recent studies indicate that various kinds of family support can reduce the stress of new parenthood and facilitate the development of secure mother-infant attachments (13,14).

On the other hand, while in certain countries, like the USA, parents are faced with multiple programs on child care and education, in others, like Portugal, middle-class parents have few opportunities to undergo this kind of learning, even at school. The inadequacy of the phantasied and expected baby to the real one lead many young parents to a negative early modelling role of communication patterns, specially when their newborn babies are less responsive, more irritable or stress labile.

The above mentioned factors, among others, foundament the new philosophy of a pediatric, psychological and educational practice through the support of first steps of parenting.

The period around birth represents an example of a crucial and risky time in the development of parent-infant discovery and adaptation. While the newborn infant is adjusting to a new environment — namely through his autonomic regulation systems — his parents, specially when he is the first, move from a dyadic to a triadic relationship (15,16).

The potential impact of pediatric well-child care on early mother-infant adjustments is far from being totally explored. It is in this context that we analyse the relevance of some studies proving that early assessment of newborn's behaviour and the sharing of such knowledge between health technicians and parents may be a way to increase parents' awareness and confidence.

The BNBAS (Brazelton Neonatal Behavioural Assessment Scale), having proved to be an effective means to reveal the complexities and competences of the newborn baby through an interactive examination, gives the opportunity of giving clinical demonstrations of newborn infant behaviour to parents, namely to the mother, a few days after delivery and, in this way, alert her to the "individual asserts" of the neonate, with a subsequent reinforcement of her self-esteem.

Different types of studies have used variations of the BNBAS as a vehicle for influencing patterns of mothering namely by providing information about neonates, and in some researches it has been possible for this information to be shared by mothers or parents and health technicians.

In the earliest studies this was either discussed or demonstrated to groups of mothers and fathers, the latter showing improvement in parental attitudes and behaviours (17,18).

A second group of studies used different kinds of populations and instruments (19,20,21,22). A third longer series appeared in the eighties (23,24,25,26,27,28,29,30,31).

Despite their valuable contributions, these studies have led to disparate results; wide variety of samples, intervention strategies, outcome instruments and measures, as well as different length of follow-up, on the one hand, no control for sex of infants, birth order and background characteristics of mothers (except for the Bristor study), on the other, make real comparisons of the studies impossible and prevent from scientifically valid orientation.

On the other hand, in all the studies already shown, no specific attention has been given to measurement of specific infant behaviour supposed to be influenced by intervention, namely through appropriate infant behaviour assessment scales, the BNBAS being the appropriate paradigm for the 1st month of life.

All these comments support the importance of introducing in the same study direct behavioural assessments of the newborn and of his communicative competences, maternal attitudes and perceptions

as well as the mother-infant interaction itself.

Contingent behaviours and different dimensions integrating a wide range of mother and infant behaviours, namely in an interactional context, have to be based upon a developmental framework as the one designed by Greenspan and Lieberman (32).

Bearing all this in mind, our study intends to measure the effects of a clinical-based intervention carried out at the hospital, on the third day post-delivery in low middle-class portuguese mothers. This intervention, based upon some BNBAS behavioural items, first demonstrated and afterwards experimented by the mother and lasting on the whole about seven minutes, is hypothesized to reinforce the mother as a mother. This is supposed to promote mother-infant attachment, increasing not only maternal awareness of the individual social competences of the newborn babies, but also maternal proficiency in interacting with the neonate, namely through the sensorial processes most easily revealed through the intervention.

Parent-infant reciprocity, being an adaptative process in the development of early relationships, involving infant's and mother's abilities of emiting cues, as well as their natural mutual interpretations, is supposed to be effective since their earliest interactions. This may lead, among other effects, to a better performance of the communicative expressions of the dyad.

According to the above mentioned considerations, we have tried to achieve this study employing specific and sensitive methods of assessment of newborn baby's behaviour, of maternal attitudes and perceptions before and after delivery, of mother-infant interactions, of communicative infant competences and, finally, of child development parameters through the first two years of life. The first part of our study, presented at this meeting, focuses only the first three months of life.

Knowing that health care is the only organized human service delivery system which reaches a large number of families with young infants, we believe, in case of confirmation of our hypothesis, that a simple and low cost early intervention may change some routines in the health care systems, namely in what concerns primiparous mothers and young parents, in particular when risk factors, in terms of parenting and attachment, are supposed to be present.

METHOD

Selection criteria of the sample

The study was carried out on 63 primiparous mothers and their newborn infants, assisted on the maternity ward of the University Hospital of Santa Maria, in Lisbon. Choice of sample obeyed to the following criteria:

Mothers: White pregnant women of Portuguese nationality; age between 18 and 35; living with baby's father for at least one year; low medium social class (based on a combination of 2 criteria, education and profession, for each one of the parents); living in the urban area of Lisbon; intention to breast-feed; intention not to work during the first two months of infant's life; without prophylactic labour preparation; uncomplicated pregnancy (haemorrhage, blood pressure above 140/90, haemoglobin values below 10 gr/ml, drug ingestion except vitamins and iron, hyperglicemia, and pelvic disproportion were excluded); 37 to 42 weeks pregnancy (gestational age confirmed by Dubowitz method), labour lasting no more than 24 hours; labour without anaesthesia and with limited analgesic medication

not exceeding 50 mg petidin and 100 mg prometacin given at mid-dilatation; vaginal delivery and cephalic presentation; vulvar forceps were admitted.

Newborns: Healthy single newborn infants with minimum Apgar score of 8 at 1st minute (obligatory of 10 at 5th minute); weight percentile between 10 and 90; absence of pathology in the early neonatal period.

General procedures: All dyads had early post-partum contact during approximately half an hour and full rooming-in after 4/6 hours of infant's life.

During their stay at the maternity, dyads stayed in identical double bed-rooms on the same ward. Pediatric routine care was daily provided by the same pediatrician (A), a member of the research team, as well as, later, on the 8th, 28th day and 3rd month of baby's life, at the out-patients clinic.

Mothers were invited, by the same pediatrician (A), to participate in the study on the first day after delivery. They were explained that the purpose of the study was the development follow-up of normal children.

Definition of groups: Mother-infant dyads were randomly assigned to two groups on the 3rd day of baby's life: the experimental group — undergoing a structured intervention — and the control group, who underwent a structured health care information.

Experimental group (N = 40): Just before discharge from maternity, another pediatrician (B) asked the mothers permission to observe the babies for about half an hour. During this time babies were assessed through the BNBAS, in another room, by another member of the research team (C,D,E or F). Pediatrician B remained, therefore, blind to the behavioural characteristics of the babies. After this period, he entered the mother's room with the baby, and the following intervention, lasting for about 7/8 minutes, took place: "— We have been observing your baby - he said - to know him, as well as his abilities. We would like you to observe, and experiment too, some of your baby's abilities. Have you ever noticed how well he can see and hear?" Pediatrician B demonstrated, then, the NBAS items of animated visual and auditory sensorial orientation and invited the mother to do the same, while stressing her ability — just because she was the mother — to elicit the best auditory performances of her baby.

With the aim of demonstrating to the mother the NBAS item "consolability", the pediatrician then stressed to the mother the baby's good reflexes and elicited the Moro reflex. The mother was invited to talk and consol the baby, to become aware of her ability to do it. The mother was finally asked to hold the baby, while the peditrician revealed her the baby's cuddliness (another NBAS item). The last minutes of the intervention consisted of a dialogue between the pediatrician and the mother about the baby's observed competences and behaviours.

Control group (N = 20): Mothers underwent the same above related procedures until the intervention period. Pediatrician B remained in the mother's room for about the same time (7/8) minutes) during which he referred pediatric special care she should observe with her baby. All members of the research team, except for pediatrician B (the one who made the intervention), were blind to the assignment of the subjects to the groups.

The research team involved in general and specific procedures included 2 pediatricians, 1 psychiatrist, 3 psychologists and 1 pedagogue.

Special procedures and assessment methods: The assessment methods used in this study were: BNBAS; Maternal Attitudes Questionnaire; Maternal Perception of Infant's Communicative Competences; Mother-Infant Interaction Observation Scale.

On the 3rd and 28th days of life, the newborn infants were assessed by the Brazelton Neonatal Behavioural Assessment Scale. The 26 behavioural and 16 neurological items of the Scale have been summarized into 6 behavioural and 1 reflex cluster by Lester et al. The 6 behavioural clusters are: 1. habituation: response decrement to repeated auditory, visual and tactile stimulation; 2. orientation: response to animate and inanimate stimuli; overall alertness; 3. motor: assesses motor maturity and motor tone; 4. range of state: assesses the rapidity and peak of excitement, and lability of state changes; 5. regulation of state: examines the infant's state control; 6. autonomic regulation: assesses signs of physiological stress such as tremors, startles and lability of skin colour. The seventh cluster includes all the reflexes.

After the second assessment, on the 28th day of baby's life, as well as for the first, examiners gave all the mothers similar positive information such as: "All is well with your baby".

The assessment of maternal attitudes and expectations seems to reflect the degree of adaptation of the expectant mother to her pregnancy and her anticipation of the baby and of the relationship that she phantasies with him. One of the five sub-scales of Kumar et al. Questionnaire ("Attitudes to pregnancy and the baby") (33) was adapted and used to assess maternal adjustment on two occasions: the first took place during labour and the second took place on the 28th day of the baby's life. A second inventory of assessment of maternal attitudes and expectations towards the baby — Broussard's Neonatal Perception Inventory — was used on the 1st and 28th days of life of the newborn (34).

An oral Questionnaire of Infant's Communicative Competences was designed to assess mother's perception of their babies. In this Questionnaire, 18 items were used, which were "clustered" into 3 sensorial areas — auditive-expressive, auditive-receptive and visual.

As for the mother/infant interaction, conceptualized as the reciporcal and dynamic adequacy of baby's and mother's communication styles, it was studied as an indicator of the degree of that adequacy. Interaction assessment will have been then to reflect the different developmental specific--phase organizational levels of mother-infant relationships and the degree of accomplishement of their inherent tasks, namely Homeostasis (0-3 months), Attachment (2-7 months), Somatic Psychological Differentiation (=-10 months), Behavioural Organization, Initiative and Internalization (9-24 months) and Representational Capacity (18-48 months).

As the focus of this presentation concerns the first three months of infant's life, the organization level of the dyad has as its main task the achievement of Homeostasis and Attachment. To assess these dimensions, and adapted to the purpose of this study, we have used the Greenspan and Lieberman Observation Scale (G.L.O.S.) (35). As for the mother, we considered 8 items for the Homeostasis Cluster and 6 for the Attachment, while for the baby 11 items were used for the Homeostasis / Attachment Cluster. The videotaped interactional sequences behaviours were scored every 15 seconds. Reliability among observers was 89%.

Single means comparisons of experimental and control groups in all measures, except for interaction assessment, were computed and a T-student statistic was used. As to the mother-inafnt interac-

tion, principal component analysis, with orthogonal Varimax rotations, were performed on the 14 items of mother's behaviour, together with the 11 items of infant's behaviour, for each of the three observation periods (8th day, 28th day and 3rd month of babies' life). Experimental and control group were compared by means of a T-statistic performed on the mean factor scores of each of the factors of three matrices.

DISCUSSION

Results seem to confirm those in other studies which have demonstrated that early intervention through the revelation to mothers of the competences of their babies, using appropriate and sensitive methods, leads to changes in maternal and infant behaviours. On the whole, till the third month of life at least, our results are demonstrative of positive effects on low middle-class primiparous portuguese mothers and their babies resulting from this early intervention with mothers, on the third day after delivery.

Better results of infant's behaviour were obtained in the experimental group, assessed by the BNBAS, most significantly in sensorial items, particularly the auditory ones – inanimate and animate auditory orientation – which renders the cluster "orientation" also significant, showing the same level of distinctive difference from the control group: ($\rho > 0{,}0001$).

These results have, among others, two possible explanations. First, a development learning of babies may have occurred through a stimulus enabler process on mothers, who became, therefore, influencers of their babies' sensorial accuracy and sensitivity. Secondly, information and experimentation regarding infant capacities may have influenced the mother's cognitive awareness of her baby's competences, therefore enhancing their sensitivity to their babies' sensorial attributes.

It seems important to stress that, the auditory items having been the most reinforced ones through intervention, the best results were also obtained on these same items through the BNBAS, and this seems to have been demonstrated in literature for the first time. The fact that these better results were obtained on the 28th day of babies' life allows us to consider that the influence of this kind of intervention may have its first expressions as early as the end of the first month of life. On the other hand, it was precisely in the same area of the infants' perceived communicative competences – the auditory-receptive area – that significantly better results were found in the experimental group (Question: "Does your baby react to voices?").

As for the assessment of mothers' attitudes, better results, although mildly significant, were obtained in the experimental group on the 28th day of babies' life, in two items: fear of hurting their babies and intention of having several children.

Results concerning mother-infant interaction in the three observation periods showed the following pattern: On the eighth day, the factorial matrix converged into 7 factors: inadequacy in mutual engagement, baby's lability in interactional engagement, homeostatic dyadic nonadjustment, dyadic negative adjustment, mother's homeostatic strategies, mother's passive engagement and dyadic paradoxical interaction.

FACTOR LOADINGS FOR MOTHER-INFANT INTERACTION MEASURES
(P.C.A. AND VARIMAX ROTATION)

8th day

GLOS ITEMS	FACTORS							
	I	II	III	IV	V	VI	VII	
MOTHER-PLEASURE	.84							
INFANT-FLAT AFFECT	.83							
INFANT-AVOIDS INTER.	.73							
INFANT-DISTRESS	-.70							
MOTHER-CONSOLING	-.54							
MOTHER-ENGAGES IN INTER.	-.52							
INFANT-SUSTAINS INTER.		.86						
INFANT-INTERRUPTS INTER.		.83						
INFANT-OVERSTIMULATED			.89					
MOTHER-FUNCTIONAL HANDLING			.61					
INFANT-NON ENGAGE.IN INTER.				.84				
MOTHER-OVERSTIMULATION				.83				
MOTHER-AFFECTIONATE BEHAV.					.85			
MOTHER-HOMEOSTATIC FACILIT.					.67			
MOTHER-FLAT AFFECT						.87		
MOTHER-NON PART. AVAILABLE						.66		
MOTHER-RHYTHMIC BEHAV.						.47		
INFANT-PLEASURE							.83	
MOTHER-ABRUPT HANDLING							.70	
EXPLAINED VARIANCE	22%	11,6%	9,7%	9,7%	7,7%	7,4%	7%	74,7%

FACTOR IV - DYADIC NEGATIVE ADJUSTMENT

	Mean Factor Scores	df	t	p
CONTROL GROUP	.53	1.45	2.64	.01
EXPERIMENTAL GROUP	-.27			

Groups showed to behave differently in the fourth factor — dyadic negative adjustment: in the Control group, more than in the Experimental one, mothers had higher overstimulating behaviours towards their babies, connected with the babies' non engagement in interaction with their mothers.

On the 28th day, the factorial matrix showed five factors: dyadic attachment, dyadic emotional passivity, baby's lability in interactional engagement, mother's interactional engagement, mother's interactional inadequacy and dyadic emotional inadequacy.

FACTOR LOADINGS FOR MOTHER-INFANT INTERACTION MEASURES
(P.C.A. AND VARIMAX ROTATION)

28th day

GLOS ITEMS	FACTORS					
	I	II	III	IV	V	
MOTHER-PLEASURE	.87					
INFANT-PLEASURE	.81					
MOTHER-ENGAGE.IN INTERACT.	.72					
INFANT-SUSTAINS INTERACT.	.69					
INFANT-FLAT AFFECT		.85				
MOTHER-HOMEOSTATIC FACILIT.		.78				
MOTHER-FLAT AFFECT		.64				
MOTHER-ABRUPT HANDLING		.40				
INFANT-INITIATION INTERACT.			.86			
INFANT-INTERRUPTION INTERACT.			.83			
MOTHER-AVERSELY INTRUSIVE				.92		
MOTHER-OVERSTIMULATION				.88		
INFANT-NON ENGAGE. IN INTERACT.					.89	
MOTHER-CONTRIVED PLEASURE					.52	
EXPLAINED VARIANCE	22,8%	17,1%	11,5%	10.5%	9%	71%

FACTOR I - DYADIC ATTACHMENT

	Mean Factor Scores	df	t	p
CONTROL GROUP	-. 44	1.48	2.21	.03
EXPERIMENTAL GROUP	. 22			

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In the first factor – dyadic attachment – groups obtained significantly different mean scores: mother's pleasure, mother's engagement in interaction, baby's pleasure and baby's sustained interaction occurred mostly in the Experimental group.

On the 3rd month of baby's life, the factorial matrix converged into 7 factors: dyadic attachment, inadequacy in mutual engagement, mother's homeostatic strategies, mother's interactional inadequacy, baby's emotional tone, baby's non engagement in interaction and mother's interactional passivity.

Groups differed significantly in the 2nd factor: mother's behaviour and homeostatic facilitation, together with infant's overstimulated state, were higher in the Control group than in the Experimental one.

FACTOR LOADINGS FOR MOTHER-INFANT INTERACTION MEASURES

(P.C.A. AND VARIMAX ROTATION)

3rd Month

GLOS ITEMS	FACTORS							
	I	II	III	IV	V	VI	VII	
INFANT-DISTRESS	-.87							
MOTHER-PLEASURE	.84							
INFANT-PLEASURE	.83							
INFANT-SUSTAINS INTERACT.	.82							
INFANT-OVERSTIMULATED		.96						
MOTHER-ENGAGES IN INTERACT.		.90						
MOTHER-CONSOLING		.85						
MOTHER-AFFECTION BEHAV.			.96					
MOTHER-HOMEOSTATIC FACILIT.			.91					
MOTHER-OVERSTIMULATION				.95				
MOTHER-AVERSELY INTRUSIVE				.91				
INFANT-FLAT AFFECT					.86			
INFANT-PLEASURE					.56			
INFANT-NON ENGAGE. INTERACT.						.94		
MOTHER-FLAT AFFECT							.83	
MOTHER-RHYTHMIC BEHAV.							-.67	
EXPLAINED VARIANCE	21,2%	19,5%	13,4%	11,7%	8,8%	7,6%	6,3%	89,6%

FACTOR II - INADEQUACY IN MUTUAL ENGAGEMENT

	Mean Factor Scores	df	t	p
CONTROL GOUP	.53	1.43	2.53	.03
EXPERIMENTAL GROUP	-.19			

The results above mentioned suggest us three main comments:

1) The first concerns the factorial patterns of mother-infant interaction across the three age--levels considered; their internal consistency, together with their specificity at each age-level, allows us to understand the evolution of the interactive process in terms of the functional meaning of the different behavioural systems within the dyad and their progressive integration converging into more adaptative interactional programs.

2) The second concerns the difference between the groups, found at the three age levels: although these differences only appear in one factor of each factorial pattern, data present some consistency that suggest a positive and persistent intervention effect.

3) The third comment concerns the similar pattern of results obtained on the first month, either using a behavioural scale — the NBAS — or a set of qualitative categories of mother-infant free interaction: as a matter of fact, differences between the two groups as measured by two instruments refer to better interactional abilities in the interventioned dyads.

Results obtained in our study suggest that infant's individuality, namely his sensorial and social abilities, may be early assessed and introduced to parents. The functional and social aspects of the neonate's behavioural repertoire, experimented by mothers, is supposed to reinforce them as mothers and, thus, make them more confident, especially when faced with their first baby.

Demonstration that a low cost and low time consuming intervention could be a potentially effective way to improve the quality of dyadic behaviour, namely during the first three months of life, may lead to promising changes in primary health care routines, especially in what concerns early mother-infant relationships.

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